

## **ABSTRACT**

To provide comprehensive MS-MS analysis, a time-nested separation is employed using two time-of-flight (TOF) mass spectrometers. Parent ions are separated in a slow and long TOF1, operating at low ion energy (1 to 100 eV), and fragment ions are mass analyzed in a fast and short TOF2, operating at much higher (keV) energy. A low energy fragmentation cell between TOF1 and TOF2 is tailored to accelerate fragmentation and dampening steps, mostly by shortening the cell and employing higher gas pressure. Slow separation in TOF1 becomes possible with an introduction of novel TOF1 analyzers. Higher performance is expected with the use of novel hybrid TOF1 analyzers, combining radio frequency (RF) and quadratic DC fields. An RF field retains low-energy ions within a TOF1 analyzer, while a quadratic DC field improves resolution by compensating for a large relative energy spread.